Explanation of upper-case Sigma Notation

If you never took linear algebra or would like a refresher, here is an explanation of the sigma notation used in both articles. This is a mathematical shorthand for summation, which is best explained with an example. One year's daily high temperature (T) at Annapolis, Maryland, are summed, and this sum is divided by the number of days in a year with 365 days to get a mean maximum temperature for the year. Here is the full formula for taking the mean of a sum of a long (or not so long) list of numbers.

$$Mean \ T \ = \ \frac{1}{N} \sum_{i=1}^{N} T_i$$

All variables should be fully defined by the person using sigma notation. In this case, there is just one variable—daily high temperature, T. Assuming no missing data, and this dataset represents a year that is not a leap year, the dataset for one full year of data contains 365 members. The subscript to T is i, and it is the counter for each member of the 365-member dataset, starting with January 1 ($i = 1$) and ending with December 31 ($i = N$). N is defined as the point where the i counter reaches the end of the dataset; in this case $N = 365$. The starting i value, usually $i = 1$, usually appears below the sigma sign, and the ending value (N, which in this case is 365) usually appears above the sigma sign. The '$i =$' notation above the sigma sign is usually omitted because it is redundant to the '$i = $' label below the sigma sign. In linear algebra, a single-dimension dataset, such as this one, is called a vector.

Some variables, such as a field of temperatures across the states of Virginia, DC, Delaware, and Maryland, represent a two-dimensional field (east-west and north-south), and these kinds of datasets are called matrices. Two sigma signs, one for each dimension, are necessary for such datasets, and each sigma sign has its own "counter" (i and j) for each dimension. By convention, i represents the east-west direction, and j represents north-south. Hence, T has two subscripts, i and j, representing the two-dimensional grid of temperatures, with the distance between the grid point in each direction (i and j) being equally spaced. Temperature intervals at each grid point can be color coded to allow for a used-friendly display, per the below example.

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